



Science

Scheme of Work

This scheme of work identifies the long-term coverage, the progression of scientific skills, progression of knowledge and links to other significant documents/websites.

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Long Term Coverage

	Autumn Term	Spring Term	Summer Term
Mars Cycle A	Scientific Enquiry Skills including seasons (4 weeks) Animals including humans (8 weeks)	Animals including humans (12 weeks)	Living things and their habitats (6 weeks) Seasonal changes (6 weeks)
Mars Cycle B	Scientific Enquiry Skills including seasons (6 weeks) Everyday Materials (6 weeks)	Uses of everyday materials (8 weeks) Plants (4 weeks)	Plants (6 weeks) Seasonal changes (6 weeks)
Venus Cycle A	Animals including humans (12 weeks)	Living things and their habitats (4 weeks) Forces (4 weeks) Light (4 weeks)	States of Matter (10 weeks)
Venus Cycle B	Rocks (10 weeks)/Electricity (2 weeks)	Electricity (2 weeks)/Sound (10 weeks)	Plants (12 weeks)
Jupiter Cycle A	Animals including humans (10 weeks) Living things and their habitats (2 weeks)	Living things and their habitats (2 weeks) Evolution and inheritance (6 weeks) Space (4 weeks)	Light (2 weeks) Transition lessons (10 weeks)
Jupiter Cycle B	Properties of changes of materials (12 weeks)	Properties of changes of materials (4 weeks) Forces (8 weeks)	Forces (2 weeks) Electricity (2 weeks) Transition lessons (8 weeks)

Progression of Scientific Skills

The following pages show the progression of the scientific skills which the children will be introduced to and then apply in their scientific learning and experimentation.

The national curriculum statements in italics in this table indicate that they feature more than once.

Mars	Venus	Jupiter
Asking questions and recognising that they can be answered in different ways		
<p>Asking simple questions and recognising that they can be answered in different ways</p> <ul style="list-style-type: none"> While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. The children answer questions developed with the teacher often through a scenario. The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered. 	<p>Asking relevant questions and using different types of scientific enquiries to answer them</p> <ul style="list-style-type: none"> The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. The children answer questions posed by the teacher. Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question. 	<p><i>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</i></p> <ul style="list-style-type: none"> Children independently ask scientific questions. This may be stimulated by a scientific experiences or involve asking further questions based on their developed understanding following an enquiry. Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.
Mars	Venus	Jupiter
Making observations and taking measurements		
<p>Observing closely, using simple equipment</p> <ul style="list-style-type: none"> Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as 	<p>Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</p>	<p>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p> <ul style="list-style-type: none"> The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.

<p>magnifying glasses or digital microscopes, to make their observations.</p> <ul style="list-style-type: none"> • They begin to take measurements, initially by comparisons, then using non-standard units. 	<ul style="list-style-type: none"> • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature, and capacity. They use standard units for their measurements. 	<ul style="list-style-type: none"> • During an enquiry, they make decisions e.g. whether they need to; take repeat readings (fair testing); increasing the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).
Mars	Venus	Jupiter
Engaging in practical enquiry to answer questions		
<p style="text-align: center;">Performing simple tests</p> <ul style="list-style-type: none"> • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out; tests to classify; comparative tests; pattern seeking enquiries and make observations over time. <p style="text-align: center;">Identifying and classifying</p> <ul style="list-style-type: none"> • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing. 	<p style="text-align: center;">Setting up simple practical enquiries comparative and fair tests</p> <ul style="list-style-type: none"> • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out; observations and tests to classify; comparative and simple fair tests; observations over time and pattern seeking. <p style="text-align: center;"><u>Explanatory note</u></p> <p>A comparative test is performed by changing a variable that is quantitate e.g. the type of material, shape of the parachute. This leads to a ranked outcome.</p> <p>A fair test is performed by changing a variable this is quantitative e.g. the thickness of the material or the area of the canopy.</p>	<p style="text-align: center;"><i>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</i></p> <ul style="list-style-type: none"> • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

	This leads to establishing a causative relationship.	
Mars	Venus	Jupiter
Recording and presenting evidence		
<p>Gathering and recording data to help in answering questions</p> <ul style="list-style-type: none"> • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings. 	<p>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.</p> <ul style="list-style-type: none"> • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates if required to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams • Children are supported to present the same data in different ways in order to help with answering the question. 	<p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <ul style="list-style-type: none"> • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g., using tables, Venn diagrams, Carroll diagrams and classification keys. • Children present the same data in different ways in order to help with answering the question.

Mars	Venus	Jupiter
Answering questions and concluding		
<p data-bbox="241 280 763 344"><i>Using their observations and ideas to suggest answers to questions</i></p> <ul data-bbox="199 384 792 683" style="list-style-type: none"> • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have made, measurements they have taken or information they have gained from secondary sources. 	<p data-bbox="835 280 1402 376">Using straightforward scientific evidence to answer questions or to support their findings.</p> <ul data-bbox="819 416 1413 616" style="list-style-type: none"> • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. 	<p data-bbox="1462 280 2011 376">Identifying scientific evidence that has been used to support or refute ideas or arguments</p> <ul data-bbox="1435 416 2029 890" style="list-style-type: none"> • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding.
<p data-bbox="241 895 763 959"><i>Using their observations and ideas to suggest answers to questions</i></p> <ul data-bbox="199 999 770 1094" style="list-style-type: none"> • The children recognise 'biggest and smallest', 'best and worst' etc. from their data. 	<p data-bbox="835 895 1402 991">Identifying differences, similarities or changes related to simple scientific ideas and processes</p> <ul data-bbox="819 1031 1391 1198" style="list-style-type: none"> • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. <p data-bbox="835 1238 1402 1366"><i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</i></p>	<p data-bbox="1462 895 2029 1094"><i>Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</i></p> <ul data-bbox="1435 1134 2018 1334" style="list-style-type: none"> • In their conclusions, children; identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.

	<ul style="list-style-type: none"> • They draw conclusions based on their evidence and current subject knowledge. 	
Mars	Venus	Jupiter
Evaluating and raising further questions and predictions		
	<p><i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</i></p> <ul style="list-style-type: none"> • They identify ways in which they adapted their methods as they progressed or how they would do it differently if they repeated the enquiry. <p><i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</i></p> <ul style="list-style-type: none"> • Children use their evidence to suggest values for different terms tested using the same method e.g. the distance travelled by a car on an additional surface. • Following a scientific experience, the children ask further questions, which can be answered by extending the same enquiry. 	<p><i>Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</i></p> <ul style="list-style-type: none"> • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data. <p><i>Using test results to make predictions to set up further comparative and fair tests</i></p> <ul style="list-style-type: none"> • Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.

Mars	Venus	Jupiter
Communicating their findings		
	<p data-bbox="846 284 1388 411">Reporting on findings from enquires, including oral and written explanations, displays or presentation of results and conclusions</p> <ul data-bbox="846 451 1388 547" style="list-style-type: none"> <li data-bbox="846 451 1388 547">• They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary. 	<p data-bbox="1464 284 2029 483"><i>Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</i></p> <ul data-bbox="1464 523 2029 611" style="list-style-type: none"> <li data-bbox="1464 523 2029 611">• They communicate their findings to an audience using relevant scientific language and illustrations

Progression of Knowledge

Demonstrates how knowledge progresses across topics from early learning goals to KS3

National Curriculum statements in red are from other linked topics

Plants

Mercury	Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Mars	Year 1	<ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants, including trees.
	Year 2	<ul style="list-style-type: none"> • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 – Living things and their habitats)
Venus	Year 3	<ul style="list-style-type: none"> • Identify and describe the functions of different parts of flowering plants, roots, stem/trunk, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
	Year 4	<ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways. (Y4 – Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 – Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 – Living things and their habitats)
Jupiter	Year 5	<ul style="list-style-type: none"> • Describe the life process of reproduction in some plants and animals. (Y5 – Living things and their habitats)
	Year 6	<ul style="list-style-type: none"> • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals (Y6 – Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics (Y6 – Living things and their habitats)
KS3		<ul style="list-style-type: none"> • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

Living things and their habitats

	Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
	Year 1	<ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 – Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees (Y1 – Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 – Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals including humans) • Observe changes across the four seasons (Y1 – Seasonal change)
	Year 2	<ul style="list-style-type: none"> • Explore and compare the differences between things that are living, dead and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. • Notice the animals, including humans, have offspring which grow into adults (Y2 – Animals including humans)
	Year 3	<ul style="list-style-type: none"> • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 – Plants)
	Year 4	<ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers to living things. • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 – Animals including humans)
	Year 5	<ul style="list-style-type: none"> • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Describe the life process of reproduction in some plants and animals.
	Year 6	<ul style="list-style-type: none"> • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents (Y6 – Evolution and inheritance) • Identify how animals and plants are adapted to suit their environment in different ways and that adaption may lead to evolution (Y6 – Evolution and inheritance)
	KS3	<ul style="list-style-type: none"> • Reproduction in humans (as an example of a mammal) including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

- Differences between species.

Animals including humans

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
Year 2	<ul style="list-style-type: none"> • Notice that animals, including humans, have offspring which grow into adults • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food (Y2 – Living things and their habitats)
Year 3	<ul style="list-style-type: none"> • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Year 4	<ul style="list-style-type: none"> • Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey.
Year 5	<ul style="list-style-type: none"> • Describe the changes as humans develop to old age. • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Y5- Living things and their habitats) • Describe the life process of reproduction in some plants and animals (Y5 – Living things and their habitats)
Year 6	<ul style="list-style-type: none"> • Identify and name the main parts of the human-circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals including humans. • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals (Y6 – Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics (Y6 – Living things and their habitats)
KS3	<ul style="list-style-type: none"> • Reproduction in humans (as an example of a mammal) including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth to include the effect of maternal lifestyle on the foetus through the placenta. • The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.

	<ul style="list-style-type: none"> • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. • The structure and functions of the gas exchange in humans, including adaptations to function. • The mechanism of breathing to move air in and out of the lungs. • The impact of exercise, asthma and smoking on the human gas exchange system.
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Evolution and inheritance

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 2	<ul style="list-style-type: none"> • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other (Y2 – Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults (Y2 – Animals including humans)
Year 3	<ul style="list-style-type: none"> • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 – Rocks)
Year 4	<ul style="list-style-type: none"> • Recognise that environments can change and that this can sometimes pose dangers to living things (Y4 – Living things and their habitats)
Year 5	<ul style="list-style-type: none"> • Describe the life process of reproduction in some plants and animals (Y5 - Living things and their habitats)
Year 6	<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
KS3	<ul style="list-style-type: none"> • Heredity as the process by which genetic information is transmitted from one generation to the next. • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. • Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction.

Seasonal changes

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day lengths varies.

Year 3	<ul style="list-style-type: none"> Recognise that light from the sun can be dangerous and that there are ways to protect their eyes (Y3 – Light)
Year 5	<ul style="list-style-type: none"> Use the ideas of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 – Earth and space)
KS3	<ul style="list-style-type: none"> The seasons and the Earth's tilt day length at different times of year, in different hemispheres.

Materials

Early Learning Goals	<ul style="list-style-type: none"> Explore the natural world around them, making observations and drawing pictures of animals and plants Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials including wood, plastic, glass, metal, water and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties.
Year 2	<ul style="list-style-type: none"> Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
Year 3	<ul style="list-style-type: none"> Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties (Y3 – Rocks) Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 – Rocks) Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials (Y3 – Forces and Magnets)
Year 4	<ul style="list-style-type: none"> Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Recognise some common conductors and insulators, as associate metals with being good conductors (Y4 – Electricity)
Year 5	<ul style="list-style-type: none"> Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
KS3	<ul style="list-style-type: none"> Chemical reactions as the rearrangement of atoms. Representing chemical reactions using formulae and using equations. Combustion, thermal decomposition, oxidation and displacement reactions. Defining acids and alkalis in terms of neutralisation reactions. The pH scale for measuring acidity/alkalinity; and indicators.

Rocks

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made (Y1 – Everyday materials) • Identify and name a variety of everyday materials including wood, plastic, glass, metal, water and rock (Y1 – Everyday materials) • Describe the simple physical properties of a variety of everyday materials (Y1 – Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties (Y1 – Everyday materials)
Year 2	<ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (y2 – Uses of everyday materials)
Year 3	<ul style="list-style-type: none"> • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.
Year 6	<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 – Evolution and Inheritance)
KS3	<ul style="list-style-type: none"> • The composition of the Earth. • The structure of the Earth. • The rock cycle and the formation of Igneous, sedimentary and metamorphic rocks.

Light

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense (Y1 – Animals including humans) • Describe the simple physical properties of a variety of everyday materials (Y1 – Materials)
Year 3	<ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change.
Year 5	<ul style="list-style-type: none"> • Compare and group together everyday materials on the basis of their properties including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets (Y5 – Properties and changes of materials)
Year 6	<ul style="list-style-type: none"> • Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from a light source to objects and then to our eyes • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
KS3	<ul style="list-style-type: none"> • The similarities and differences between light waves and waves in matter. • Light waves travelling through a vacuum; speed of light. • The transmission of light through materials; absorption, diffuse scattering and specular reflection at a surface. • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative) the human eye. • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

Forces

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 2	<ul style="list-style-type: none"> • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2 – Uses of everyday materials)
Year 3	<ul style="list-style-type: none"> • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.
Year 5	<ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction that act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
KS3	<ul style="list-style-type: none"> • Magnetic fields by plotting with compass, representation by field lines. • Earth's magnetism, compass and navigation. • Forces as pushes or pulls, arising from the interaction between two objects. • Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. • Moment as the turning effect of a force. • Forces; associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. • Forces measured in Newtons, measurements of stretch or compression as force is changed.

Sound

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals including humans)
Year 4	<ul style="list-style-type: none"> • Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. • Find patterns between the pitch of a sound and features of the object that produced it. • Find patterns between the volume of a sound and the strength of the vibrations that produced it. • Recognise that sounds get fainter as the distance from the sound source increases.
KS3	<ul style="list-style-type: none"> • Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel superposition. • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. • Sound needs a medium to travel, the speed of sound in air, in water, in solids. • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. • Auditory range of humans and animals. • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. • Waves transferring information for conversion to electrical signals by microphone.

Electricity

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 4	<ul style="list-style-type: none"> • Identify common appliances that run on electricity • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.
Year 6	<ul style="list-style-type: none"> • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram.
KS3	<ul style="list-style-type: none"> • Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. • Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. • Differences in resistance between conducting and insulating components (quantitative) • Static electricity.

Earth and Space

Early Learning Goals	<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.
Year 1	<ul style="list-style-type: none"> • Observe changes across the four seasons. (Y1 – Seasonal changes) • Observe and describe weather associated with the seasons and how day lengths varies. (Y1 – Seasonal changes)
Year 5	<ul style="list-style-type: none"> • Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. • Describe the movement of the Moon relative to the Earth. • Describe the Sun, Earth and Moon as approximately spherical bodies. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
KS3	<ul style="list-style-type: none"> • Gravity force, weight = mass x gravitational field strength (g) on Earth $g = 10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). • Our sun as a star, in our galaxy, other galaxies. • The seasons and the Earth's tilt day length at different times of year, in different hemispheres. • The light year as a unit of astronomical distance.

Subject Breakdown

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

EYFS

This topic is based on the updated EYFS goals which will be statutory from September 2021

EYFS – The natural world

National Curriculum Objectives

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class
- Understand some important processes and changes in the natural world around them, including the seasons and change states of matter.

Future Learning

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 – Plants)
- Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 – Plants)
- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals including humans)
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 – Animals including humans)
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals including humans)
- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals including humans)
- Distinguish between an object and the material from which it is made. (Y1 – Everyday materials)
- Identify and name a variety of everyday materials including wood, plastic, glass, metal, water and rock. (Y1 – Everyday materials)
- Describe the simple physical properties of a variety of everyday materials. (Y1 – Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials)
- Observe changes across the four seasons (Y1 – Seasonal Changes)
- Observe and describe weather associated with the seasons and how day length varies (Y1 – Seasonal Changes)

What pupils need to know or do to be secure

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
<p>That there are different types of animals and plants that live in different areas in the world. That animals and plants look different and have different types of bodies.</p> <p>That different areas of the world are different to our own e.g., the arctic is covered in snow and ice that is it cold. Those other countries are similar to us in the animals and trees that live there.</p> <p>That there are four seasons and the weather is different in the four seasons. That there are different special celebrations that happen in the four seasons to help them to relate a season to a time of year.</p>	<ul style="list-style-type: none"> • Can name trees and other plants that they see regularly • Can name animals that they see regularly • Can name the four seasons and describe them • Can look at a picture and point out the main characteristics in comparison with their local environment • Can name the parts of their bodies • Can identify whether an object has been frozen or melted

That things can melt and freeze. That this means that they change. E.g., that water can freeze to become ice and then it is cold and solid but that when chocolate melts it becomes warm and liquid. (the terms liquid and solid do not need to be taught)	
Key vocabulary	
<ul style="list-style-type: none"> • Head, body, eyes, ears, mouth, teeth, leg, feet, arms, hands, • Names of animals and plants • Seasons (Summer, winter, autumn, spring) 	
Common misconceptions	
Some children may think; <ul style="list-style-type: none"> • That humans are not animals • That once something melts or is frozen it cannot be reversed • That it always snows in winter • That there are only flowers in spring and summer • That all plants are the same • That trees are not plants 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Observation of plants growing and how they change over time • Observation and interaction with ice to investigate how it melts • Taking a photograph of themselves and identifying the parts of the body • Cut and stick activity to put the body together • Weather station – to look at the changing weather (seasons) • Cooking- melting chocolate with the children to show them how this has changed. • Nature walks – investigating the school and local environment • Trip – to the farm to learn more about the animals, focusing on naming and describing. 	<ul style="list-style-type: none"> • Can sort animals into groups e.g. dogs vs fish • Demonstrate their knowledge in different ways e.g. writing a seasonal sentence, creating seasonal artwork, • Can point to and identify parts of their body or an animals body • Can observe and explain objects that are melting or have been frozen

Year 1

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

Year 1 – Plants

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants, including trees. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Explore the natural world around them, making observations and drawing pictures of animals and plants (EYFS – The natural world) Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (EYFS – The natural world) Understand some important processes and changes in the natural world around them, including the seasons and change states of matter. (EYFS – The natural world) 	<ul style="list-style-type: none"> Observe and describe how seeds and bulbs grow into mature plants (Y2 – Plants) Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy (Y2 – Plants) Identify and name a variety of plants and animals in their habitats including microhabitats (Y2 – Living things and their habitats) Identify and describe the functions of different parts of flowering plants; roots, stem/trunk, leaves and flowers (Y3 – Plants) Investigate the way in which water is transported within plants (Y3 – Plants)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Growing locally, there will be a vast array of plants, which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts, but they vary between the different types of plants. Some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring.</p>	<ul style="list-style-type: none"> Can name trees and other plants that they see regularly Can describe some of the key features of these trees and plants e.g. the shape of the leaves, the colour of the flower/blossom Can point out trees which lost their leaves and those that kept them the whole year Can point to and name the parts of a plant, recognising that they are not always the same e.g. leaves and stems may not be green
Key vocabulary	
<p>Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, Name of trees in the local area and the name of garden and wild flowering plants in the local area.</p>	

Common misconceptions

Some children may think;

- Plants are flowering plants grown in pots with coloured petals and leaves and a stem
- Trees are not plants
- All leaves are green
- All stems are green
- A trunk is not a stem
- Blossom is not a flower

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Make close observations of leaves, seeds, flowers etc. • Compare two leaves, seeds, flowers etc. • Classify leaves, seeds, flower etc. using a range of characteristics • Identify plants by matching them to named images • Make observations of how plants change over a period of time • When further afield, spot plants that are the same as those in the local area studied regularly describing the key features that helped them. 	<ul style="list-style-type: none"> • Can sort and group parts of plants using similarities and differences • Can use simple charts etc. to identify plants • Can collect information on features that change during the year • Can use photographs to talk about how plants change over time

Year 1 – Animals including humans

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) Identify, name, draw, and label the basic parts of the human body and say which part of the body is associated with each sense 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Explore the natural world around them, making observations and drawing pictures of animals and plants (EYFS – The natural world) Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (EYFS – The natural world) Understand some important processes and changes in the natural world around them, including the seasons and change states of matter. (EYFS – The natural world) 	<ul style="list-style-type: none"> Describe how animals obtain their food from plants and other animals using the idea of a simple food chain, and identify and name different sources of food (Y2 – Living things and their habitats) Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals (Y6 – Living things and their habitats) Give reasons for classifying plants and animals based on specific characteristics (Y6 – Living thing and their habitats)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Animals vary in many ways having different structures e.g. wings, tails, ears, etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them.</p> <p>Animals eat certain things – some eat other animals, some eat plants, some eat both plants and animals.</p>	<ul style="list-style-type: none"> Can name a range of animals which includes animals from each of the vertebrate groups Can describe the key features of these named animals Can label key features on a picture/diagram Can write descriptively about an animal Can write a What am I? riddle about an animal

<p>Humans have key parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.</p>	<ul style="list-style-type: none"> • Can describe what a range of animals eat • Can play and lead ‘Simon says’ • During PE lessons, can follow instructions involving parts of the body.
<p>Key vocabulary</p>	<ul style="list-style-type: none"> • Can label parts of the body on pictures and diagrams • Can explore objects using different senses.
<ul style="list-style-type: none"> • Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves • Names of animals experienced first-hand from each vertebrate group • Parts of the body including those linked to PSHE teaching • Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue. <p>NB</p> <p>The children need to be able to name and identify a range of animals In each group e.g. name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know they key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics.</p> <p>The children also do not need to use the words carnivore, herbivore and omnivore. If they do, ensure that they understand that carnivores eat other animals, not just meat.</p> <p>Although we often use our fingers and hands to feel objects, the children should understand that we can feel with many parts of our body.</p>	
<p>Common misconceptions</p>	
<p>Some children may think;</p> <ul style="list-style-type: none"> • Only four legged mammals such as pets are animals • Humans are not animals • Insects are not animals 	

- All 'bugs' or 'creepy crawlies' such as spiders, are part of the insect group
- Amphibians and reptiles are the same

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Make first-hand, close observations of animals from each of the groups • Compare two animals from the same or different groups • Classify animals using a range of features • Identify animals by matching them to named images • Classify animals according to what they eat • Make first-hand close observations of parts of the body e.g. hands, eyes • Compare two people • Take measurements of parts of their body • Compare parts of their own body • Look for patterns between people e.g. Do people with big hands have big feet? • Classify people according to their features • Investigate human senses e.g. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match? 	<ul style="list-style-type: none"> • Can sort and group animals using similarities and differences • Can use simple charts etc. to identify unknown animals • Can create a drawing of an imaginary animal labelling its key features • Can use secondary resources to find out what animals eat, including talking to experts e.g. pet owners, zookeepers etc. • Can use first hand close observations to make detailed drawings • Can name body parts correctly when talking about measures and comparisons e.g. 'my arm is x straws long,' 'my arm is x straws long and my leg is y straws long. My leg is longer than my arm' 'We both have hands, but his are bigger than mine' 'These people have brown eyes and these have blue' • Can talk about their findings from investigations using appropriate vocabulary e.g. 'My fingers are much better at feeling than my toes' 'We found that the crisps all taste the same'

Year 1 – Everyday Materials

National Curriculum Objectives	
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants (EYFS – The natural world) • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (EYFS – The natural world) • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter. (EYFS – The natural world) 	<ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (Y2 – Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2 – Uses of everyday materials)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons.</p> <p>Materials can be described by their properties e.g. shiny, stretchy, rough, etc. Some materials e.g. plastic can be in different forms with very different properties.</p>	<ul style="list-style-type: none"> • Can label a picture or diagram of an object made from different materials • Can describe the properties of different materials

Key vocabulary	
Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see through.	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • Only fabrics are materials • Only building materials are materials • Only writing materials are materials • The word 'rock' describes an object rather than a material • 'solid' is another word for hard 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Classify objects made of one material in different ways e.g. a group of objects made of metal • Classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials • Classify materials based on their properties • Test the properties of objects e.g. absorbency of cloths, strength of part hats made of different papers, stiffness of paper plates, and waterproofness of shelters. 	<ul style="list-style-type: none"> • Can sort objects and materials using a range of properties • Can choose an appropriate method for testing an object for a particular property • Can use their test evidence to answer the questions about properties e.g., 'Which cloth is the most absorbent?'

Year 1 – Seasonal Changes

National Curriculum Objectives	
<ul style="list-style-type: none"> • Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants (EYFS – The natural world) • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (EYFS – The natural world) • Understand some important processes and changes in the natural world around them, including the seasons and change states of matter. (EYFS – The natural world) 	<ul style="list-style-type: none"> • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes (Y3 – Light) • Use the idea of Earth’s rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 – Earth and space) • The seasons and the Earth’s tilt, day length at different times of year, in different hemispheres (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.</p> <p>The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are; numbers of mini-beasts found outside; seed and plant growth; leaves on trees and type of clothes worn by people. .</p>	<ul style="list-style-type: none"> • Can name the four seasons and identify when in the year they occur • Can describe weather in different seasons over a year • Can describe days as being longer (in time) in the summer and shorter in the winter. • Can describe other features that change through the year.
Key vocabulary	

<ul style="list-style-type: none"> • Weather (sunny, rainy, windy, snowy etc.) • Seasons (winter, summer, spring, autumn) • Sun, sunrise, sunset, day length 	
Common misconceptions	
<p>Some children may think;</p> <ul style="list-style-type: none"> • It always snows in winter • It is always sunny in the summer • There are only flowers in spring and summer • It rains most in the winter 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Collect information about the weather regularly throughout the year. • Present this information in tables and charts to compare the weather across the seasons • Collect information, regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans • Present this information in different ways to compare the seasons • Gather data about day length regularly throughout the year and present this to compare the seasons 	<ul style="list-style-type: none"> • Use the evidence gathered to describe the general types of weather and changes in day length over the seasons • Use their evidence to describe some other features of their surroundings e.g. themselves, animals, plants that change over the seasons • Demonstrate their knowledge in different ways e.g. making a weather forecast video, writing seasonal poetry, creating seasonal artwork.

Year 2

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

Year 2 – Living things and their habitat

National Curriculum Objectives	
<ul style="list-style-type: none"> • Explore and compare the differences between things that are living, dead and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees (Y1 – Plants) • Identify and describe the basic structure of a variety of common flowering plants including trees (Y1 – Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores (Y1 – Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) (Y1 – Animals including humans) • Observe changes across the four seasons (Y1 – Seasonal changes) 	<ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways (Y4 – Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment (Y4 – Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 – Living things and their habitats) • Construct and interpret a variety of food chains, identifying producers, predators and prey (Y4 – Animals including humans)

What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. Dead things include dead animals, plants, and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair, and feathers (this is a simplification, but appropriate for Year 2 children.)</p> <p>An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels).</p> <p>Animals and plants live in a habitat, to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water.</p> <p>Within a habitat there are different microhabitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These microhabitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. The plants and animals in a habitat depend on each other for food etc. the way that animals obtain their food from plants and other animals can be shown in a food chain.</p>	<ul style="list-style-type: none"> • Can find a range of items outside that are living, dead and never lived • Can name a range of animals and plants that live in a habitat and micro-habitats that they have studied • Can talk about how the features of these animals and plants make them suitable to the habitat • Can talk about what the animals eat in a habitat and how the plants provide shelter for them • Can construct a food chain that starts with a plant and has the arrows pointing in the correct direction.
Key vocabulary	
<ul style="list-style-type: none"> • Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed • Names of local habitats e.g. pond, woodland, etc. • Names of micro-habitats e.g. under logs, in bushes etc. 	

Common misconceptions

Some children may think;

- An animal's habitat is like its 'home'
- Plants and seeds are not alive as they cannot be seen to move
- Fire is living
- Arrows in a food chain means 'eats'

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Explore the outside environment regularly to find objects that are living, dead and have never lived. • Classify objects found in the local environment • Observe animals and plants carefully, drawing and labelling diagrams. • Create simple food chains for a familiar local habitat from first-hand observation and research • Create simple food chains from information given e.g. in picture books (Gruffalo etc.). 	<ul style="list-style-type: none"> • Can sort into living, dead and never lived • Can give key features that mean the animal or plant is suited to its micro-habitat • Using a food chain can explain what animals eat • Can explain in simple terms why an animal or plant is suited to a habitat e.g. the caterpillar cannot live under the soil like a worm, as it needs fresh leaves to eat; the seaweed we found on the beach cannot live in our pond because it is not salty.

Year 2 - Plants

National Curriculum Objectives	
<ul style="list-style-type: none"> • Observe and describe how seeds and bulbs grow into mature plants • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 – Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 – Plants) 	<ul style="list-style-type: none"> • Identify and describe the functions of different parts of flowering plants; roots, stem/trunk, leaves and flowers (Y3 – Plants) • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant (Y3 – Plants) • Investigate the way in which water is transported within plants (Y3 – Plants) • Explore the part that flowers play in the life cycle of flowering plants including pollination, seed formation and seed dispersal (Y3 – Plants)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings, which then continue to grow into mature plants. These mature plants may have flowers, which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy.</p>	<ul style="list-style-type: none"> • Can describe how plants that they have grown from seeds and bulbs have developed over time • Can identify plants that grew well in different conditions

Key vocabulary	
Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, Light, shade, sun, warm, cool, water, grow, healthy Name of trees in the local area and the name of garden and wild flowering plants in the local area.	
Common misconceptions	
Some children may think; <ul style="list-style-type: none"> • Plants are not alive as they cannot be seen to move • Seeds are not alive • All plants start out as seeds • Seeds and bulbs need sunlight to germinate 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Make close observations of seeds and bulbs • Classify seeds and bulbs • Research and plan when and how to plant a range of seeds and bulbs • Look after the plants as they grow – weeding, thinning, watering etc. • Make close observations and measurements of their plants growing from seeds and bulbs. • Make comparisons between plants as they grow 	<ul style="list-style-type: none"> • Can spot similarities and difference between bulbs and seeds • Can nurture seeds and bulbs into mature plants identifying the different requirements of different plants

Year 2 – Animals including humans

National Curriculum Objectives	
<ul style="list-style-type: none"> • Notice that animals including humans, have offspring which grow into adults • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify and name a variety of common animals that are carnivores, herbivores and omnivores (Y1 – Animals including humans) • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense (Y1 – Animals, including humans) 	<ul style="list-style-type: none"> • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 – Animals including humans) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Y5 – Living things and their habitats) • Describe the life process of reproduction in some plants and animals (Y5 – Living things and their habitats) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 – Animals including humans)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Animals including humans have offspring, which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages, which then grow into adults. The young of some animals do not look like their parents e.g. tadpoles.</p>	<ul style="list-style-type: none"> • Can describe how animals, including humans, have offspring which grow into adults, using the appropriate names for the stages • Can state the basic needs of animals, including humans, for survival

<p>All animals including humans, have basic needs of feeding, drinking and breathing that must be satisfied in order to survive. To grow into healthy adults, they also need the right amounts and types of food and exercise.</p> <p>Good hygiene is also important in preventing infections and illnesses.</p>	<ul style="list-style-type: none"> • Can state the importance for humans of exercise, eating the right amounts of different types of food and hygiene • Can name foods in each section of the Eatwell Guide
Key vocabulary	
<p>Offspring, reproduction, growth, child, young/old stages (examples, chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)</p>	
Common misconceptions	
<p>Some children may think;</p> <ul style="list-style-type: none"> • An animal’s habitat is like its ‘home’ • All animals that live in the sea are fish • Respiration is breathing • Breathing is respiration 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Ask people questions and use secondary sources to find out about the life cycles of some animals • Observe animals growing over a period of time e.g. chicks, caterpillars, a baby • Ask questions of a parent about how they look after their baby • Ask pet owners questions about how they look after their pet. • Explore the effect of exercise on their bodies • Classify food in a range of ways, including using the Eatwell Guide • Investigate washing hands, using glitter gel 	<ul style="list-style-type: none"> • Can describe, including using diagrams, the life cycle of some animals, including humans, and their growth to adults e.g. by creating a life cycle book for a younger child. • Can measure/observe how animals, including humans, grow • Show what they know about looking after a baby/animal by creating a parenting/pet owners’ guide • Explain how development and health might be affected by differing conditions and needs being met/not met

Year 2 – Uses of everyday materials

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Distinguish between an object and the material from which is made (Y1 – Everyday materials) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock (Y1- Everyday materials) Describe the simple physical properties of a variety of everyday materials (Y1 – Everyday materials) Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials) 	<ul style="list-style-type: none"> Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties (Y3 – Rocks) Notice that some forces need contact between two objects, but magnetic forces can act at a distance (Y3 – Forces and magnets) Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets (Y5 – Properties and changes of materials) Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 – Properties and changes of materials)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it hold the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials,</p>	<ul style="list-style-type: none"> Can name an object, say what material it is made from, identify its properties and make a link between the properties and make a link between the properties and a particular use Can label a picture or diagram of an object made from different materials

<p>identified through simple tests and classifying activities, a material can be suitable for different purposes and an object can be made of different materials.</p> <p>Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness,</p>	<ul style="list-style-type: none"> • For a given object can identify what properties a suitable material needs to have. • Whilst changing the shape of an object can describe the action used • Can use the words flexible and/or stretchy to describe materials that can be changed in shape and stiff and/or rigid for those that cannot • Can recognise that a material may come in different forms, which have different properties.
<p>Key vocabulary</p>	
<p>Name of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard</p> <p>Properties of materials – as for Year 1 plus opaque, transparent and translucent reflective, non-reflective, flexible and rigid.</p> <p>Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching.</p>	
<p>Common misconceptions</p>	
<p>Some children may think;</p> <ul style="list-style-type: none"> • Only fabrics are materials • Only building materials are materials • Only writing materials are materials • The word rock describes an object rather than a material • Solid is another word for hard. 	

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Classify materials • Make suggestions about alternative materials for a purpose that are both suitable and unsuitable • Test the properties of materials for particular uses e.g. compare the stretches of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat. 	<ul style="list-style-type: none"> • Can sort materials using a range of properties • Can explain using the key properties why a material is suitable or not suitable for a purpose • Can begin to choose an appropriate method for testing a material for a particular property • Can use their test evidence to select appropriate material for a purpose e.g. which material is the best for a rain hat?

Year 3

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

Year 3 – Plants

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify and describe the functions of different parts of flowering plants; roots’ stem/trunk; leaves and flowers Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Observe and describe how seeds and bulbs grow into mature plants (Y2 – Plants) Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy (Y2 – Plants) 	<ul style="list-style-type: none"> Describe the life process of reproduction in some plants and animals (Y5 – Living things and their habitats) Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal including quantitative investigation of some dispersal mechanisms (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant’s food. Some plants produce flowers, which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits, which are then dispersed in different ways. Different plants require different conditions for germination and growth.</p>	<ul style="list-style-type: none"> Can explain the function of the parts of a flowering plant Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination. Can give different methods of pollination and seed dispersal, including examples

Key vocabulary	
Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • Plants eat food • Food comes from the soil via the roots • Flowers are merely decorative rather than a vital part of the life cycle in reproduction • Plants only need sunlight to keep them warm • Roots such in water which is then sucked up the stem 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Observe what happens to plants over time when the leaves or roots are removed • Observe the effect of putting cut white carnations or celery in coloured water. • Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space • Spot flowers, seeds, berries and fruits outside throughout the year • Observe flowers carefully to identify the pollen • Observe flowers being visited by pollinators e.g. bees and butterflies • Observe seeds being blown from the trees e.g. sycamore seeds • Research different types of seed dispersal • Classify seeds in a range of ways, including by how they are dispersed • Create a new species of flowering plant 	<ul style="list-style-type: none"> • Can explain observations made during investigations • Can look at the features of seeds to decide on their methods of dispersal • Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal.

Year 3 – Animals including humans

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food – they get nutrition from what they eat Identify that humans and some other animals have skeletons and muscles for support, protection and movement. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals (Y1 – Animals including humans) Identify and name a variety of common animals that are carnivores, herbivores and omnivores (Y1 – Animals including humans) Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) (Y1 – Animals including humans) Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 – Animals including humans) Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene (Y2 – Animals including humans) 	<ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans (Y4 – Animals including humans) Identify the different types of teeth in humans and their simple functions (Y4 – Animals including humans) Construct and interpret a variety of food chains, identifying producers, predators and prey (Y4 – Animals including humans) Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Animals unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients.</p> <p>Humans and some other animals have skeletons and muscles, which help them, move and provide protection and support.</p>	<ul style="list-style-type: none"> Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give use the correct amount of these nutrients Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection. Can describe how muscles and joints help them to move

Key vocabulary	
Nutrients, nutrition, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • Certain whole food groups like fats are 'bad' for you • Certain specific foods, like cheese are also 'bad' for you • Diet and fruit drinks are 'good' for you • Snakes are similar to worms, so they must also be invertebrates • Invertebrates have no form of skeleton 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Classify food in a range of ways • Use food labels to explore the nutritional content of a range of food items • Use secondary sources to find out the types of food that contain the different nutrients • Use food labels to answer enquiry questions, e.g. how much fat do different types of pizza contain? How much sugar is in soft drinks? • Plan a daily diet to contain a good balance of nutrients • Explore the nutrients contained in fast food • Use secondary sources to research the parts and functions of the skeleton • Investigate patterns asking questions such as – Can people with longer legs run faster? Can people with bigger hand catch a ball better? • Compare, contrast and classify skeletons of different animals 	<ul style="list-style-type: none"> • Can classify food into those that are high or low in particular nutrients • Can answer the questions about nutrients in food, based on their gathered evidence • Can talk about the nutrient content of their daily plan • Use their data to look for patterns (or lack of them) when answering their enquiry question • Can give similarities e.g., they all have joints to help the animal move, and differences between skeletons.

Year 3 - Rocks

National Curriculum Objectives	
<ul style="list-style-type: none"> • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made (Y1 – Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock (Y1 – Everyday materials) • Describe the simple physical properties of a variety of everyday materials (Y1 – Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties (Y1 – Everyday materials) • Identify and compare the suitability of a variety of everyday materials including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (Y2 – Uses of everyday materials) 	<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago (Y6 – Evolution and inheritance) • The composition of the Earth (KS3) • The structure of the Earth (KS3) • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Rock is naturally material. There are different types of rock e.g. sandstone, limestone slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock, which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.</p> <p>Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed; They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</p>	<ul style="list-style-type: none"> • Can name some types of rock and give physical features of each • Can explain how a fossil is formed • Can explain that soils are made from rocks and also contain living/dead matter

Key vocabulary	
Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • Rocks are all hard in nature • Rock-like, man-made substances such as concrete or brick are rocks • Materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural' • Certain found artefacts, like old bits of pottery or coins are fossils • A fossil is an actual piece of the extinct animal or plant • Soil and compost are the same thing 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Observe rocks closely • Classify rocks in a range of ways, based on their appearance • Devise a test to investigate the hardness of a range of rocks • Devise a test to investigate how much water different rocks absorb • Observe how rocks change over time e.g. gravestones or old buildings • Research using secondary sources how fossils are formed • Observe soils closely • Classify soils in a range of ways based on their appearance • Devise a test to investigate the water retention of soils • Observe how soil can be separated through sedimentation • Research the work of Mary Anning 	<ul style="list-style-type: none"> • Can classify rocks in a range of different ways, using appropriate vocabulary • Can devise test to explore the properties of rocks and use data to rank the rocks • Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily • Can present in different ways their understanding of how fossils are formed e.g. in role-play, comic strip, chronological report, stop-go animation etc. • Can identify plant/animal matter and rocks in samples of soil • Can devise a test to explore the water retention of soils

Year 3 – Light

National Curriculum Objectives	
<ul style="list-style-type: none"> Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – animals including humans) Describe the simple physical properties of a variety of everyday materials (Y1 – Materials) 	<ul style="list-style-type: none"> Recognise that light appears to travel in straight lines (Y6 – Light) Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye (Y6 Light) Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes (Y6 – Light) Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 – Light)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective.</p> <p>The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light.</p> <p>Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.</p>	<ul style="list-style-type: none"> Can describe how we see objects in light and can describe dark as the absence of light Can state that it is dangerous to view the sun directly and state that it is dangerous to view the sun directly and state precautions used to view the sun, for example, in eclipses Can define transparent, translucent and opaque Can describe how shadows are formed

Key vocabulary	
Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • We can still see where there is an absence of any light • Our eyes 'get used' to the dark • The moon and reflective surfaces are light sources • A transparent object is a light source • Shadows contain details of the object, such as facial features on their own shadow • Shadows result from objects giving off darkness 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Explore how different objects are more or less visible in different levels of lighting. • Explore how objects with different surfaces e.g. shiny vs matt, are more or less visible • Explore how shadows vary as the distance between a light source and an object or surface is changed • Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground • Choose suitable materials to make shadow puppets • Create artwork using shadows 	<ul style="list-style-type: none"> • Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change • Can clearly explain, giving examples, that objects are not visible in complete darkness • Can describe and demonstrate how shadows are formed by blocking light • Can describe, demonstrate and make predictions about patterns in how shadows vary

Year 3 – Forces and Magnets

National Curriculum Objectives	
<ul style="list-style-type: none"> • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. 	
Prior Learning	Future Learning
<p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2 – Uses of everyday materials)</p>	<ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object (Year 5 – forces) • Identify the effects of air resistance, water resistance and friction that act between moving surfaces. (Year 5 – forces) • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Year 5 – forces) • Magnetic fields by plotting with compass, representation by field lines (KS3) • Earth's magnetism, compass and navigation (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.</p> <p>A magnet attracts magnetic material, iron and nickel and other materials containing these e.g. stainless steel, are magnetic. The</p>	<ul style="list-style-type: none"> • Can give examples of forces in everyday life • Can give examples of objects moving differently on different surfaces • Can name a range of types of magnets and show how the poles attract and repel

<p>strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south are brought together they will pull together – attract.</p> <p>For some forces to act there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.</p>	<ul style="list-style-type: none"> • Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets
<p style="text-align: center;">Key vocabulary</p>	
<p>Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnets, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole.</p>	
<p>Common misconceptions</p>	
<p>Some children may think;</p> <ul style="list-style-type: none"> • The bigger the magnet the stronger it is • All metals are magnetic 	
<p>Apply knowledge in familiar related contexts, including a range of enquiries</p>	
<p>Activities</p>	<p>Possible evidence</p>
<ul style="list-style-type: none"> • Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc. • Explore what materials are attracted to a magnet. • Classify materials according to whether they are magnetic • Explore the way that magnets behave in relation to each other. • Use a marked magnets work at a distance e.g. through the table, in water, jumping paper clips up off the table • Devise an investigation to test the strength of magnets 	<ul style="list-style-type: none"> • Can use their results to describe how objects move on different surfaces • Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface • Can use classification evidence to identify that some metals, but not as long as it spun on that surface. • Through their exploration, they can show how like poles repel and unlike poles attract and name unmarked poles. • Can use test data to rank magnets

Year 4

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

Year 4 – Living things and their habitats

National Curriculum Objectives	
<ul style="list-style-type: none"> Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees (Y1 – Plants) Identify and describe the basic structure of a variety of common flowering plants, including trees (Y1 – Plants) Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – animals Inc. hum) Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) (Y1 – Animals including humans) Identify and name a variety of plants and animals in their habitats, including microhabitats (Y2 – Living things and their habitats) 	<ul style="list-style-type: none"> Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Y5 – Living things and their habitats) Describe the life process of reproduction in some plants and animals (Y5 – Living things and their habitats) Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganisms, plants and animals (Y6- Living things and their habitats) Give reasons for classifying plants and animals based on specific characteristics (Y6 Living things and their habitats)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.</p> <p>Living things live in a habitat which provides an environment to which they are suited (Year 2 learning) These environment may change naturally e.g. flooding, fire, earthquake etc. Humans also cause the environment to change. This ca be in a good way e.g. nature reserves or bad way e.g. littering. These environments also change with the seasons; different living things can be found in a habitat at different times of the year.</p>	<ul style="list-style-type: none"> Can name living things living in a range of habitats giving the key features that helped them to identify them Can give examples of how an environment may change both naturally and due to human impact

Key vocabulary	
Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • The death of one of the parts of a food chain or web is no or limited consequences on the rest of the chain • There is always plenty of food for wild animals • Animals are only land-living creatures • Animals and plants can adapt to their habitats, however they change • All changes to habitats are negative 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Observe plants and animals in different habitats throughout the year • Compare and contrast the living things observed • Use classification keys to name unknown living things • Classify living things found in different habitats based on their features • Create a simple identification key based on observable features • Use fieldwork to explore human impact on the local environment e.g. litter, tree planting • Use secondary sources to find out about how environments may naturally change • Use secondary sources to find out about human impact both positive and negative on the environment 	<ul style="list-style-type: none"> • Can keep a careful record of living things found in different habitats throughout the year (diagrams, tally charts etc.) • Can use classification keys to identify unknown plants and animals • Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter.

Year 4 – Animals including humans

National Curriculum Objectives	
<ul style="list-style-type: none"> • Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify and name a variety of common animals that are carnivores, herbivores and omnivores (Y1 – Animals Inc. humans) • Find out about and describe the basic needs of animals including humans for survival (water, food and air). (Y2 – Animals Inc. humans) • Describe the importance for humans of exercise eating the right amounts of different types of food and hygiene (Y2 – Animals Inc. h) • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat (Y3 – Animals Inc. humans) 	<ul style="list-style-type: none"> • Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood (Y6 – Animals including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (Y6 – Animals including humans) • Describe the ways in which nutrients and water are transported within animals including humans (Y6 – Animals including humans)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added.</p>	<ul style="list-style-type: none"> • Can sequence the main parts of the digestive system • Can draw the main parts of the digestive system onto a human outline • Can describe what happens in each part of the digestive system

<p>The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.</p> <p>Humans have four types of teeth; incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).</p> <p>Living things can be classified as producers, predators and prey according to their place in the food chain.</p>	<ul style="list-style-type: none"> • Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for • Can name producers, predators and prey within a habitat
<p>Key vocabulary</p>	
<p>Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain,</p>	
<p>Common misconceptions</p>	
<p>Some children may think;</p> <ul style="list-style-type: none"> • Arrows in a food chain means 'eat' • The death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain • There is always plenty of food for wild animals • Your stomach is where your belly button is • Food is digested only in the stomach • When you have a meal, your food goes down one tube and your drink down another • The food you eat becomes 'poo' and the drink becomes 'wee' 	

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Research the function of the parts of the digestive system • Create a model of the digestive system using household objects • Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing) • Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls • Use food chains to identify producers, predators and prey within a habitat • Use secondary sources to identify animals in a habitat and find out what they eat. 	<ul style="list-style-type: none"> • Can use diagrams or a model to describe the journey of food through the body explaining what happens in each part • Can record the teeth in their mouth (make a dental record) • Can explain the role of the different types of teeth • Can explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores • Can create food chains based on research

Year 4 – States of matter

National Curriculum Objectives

- Compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Prior Learning

- Distinguish between an object and the material from which it is made (Y1 – Everyday materials)
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock (Y1 – Everyday materials)
- Describe the simple physical properties of a variety of everyday materials (Y1 – Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties (Y1 – Everyday materials)
- Identify and compare the suitability of a variety of everyday materials including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (Y2 – Uses of everyday materials)
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2 – Uses of everyday materials)

Future Learning

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets (Y5 – Properties and changes of materials)
- Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution (Y5 – Properties and changes of materials)
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating (Y5 – Properties and changes of materials)
- Demonstrate that dissolving, mixing and changes of state are reversible changes (Y5 – Properties and changes of materials)
- Explain that some changes result in the formation of new materials and that this kind of changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda (Y5 – Properties and changes of materials).

What pupils need to know or do to be secure

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
<p>A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.</p> <p>Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0°C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling.</p> <p>Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.</p>	<ul style="list-style-type: none"> • Can create a concept map, including arrows linking key vocabulary • Can name properties of solids, liquids and gases • Can give everyday examples of melting and freezing • Can give everyday examples of evaporation and condensation • Can describe the water cycle
Key vocabulary	
<p>Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, and water cycle.</p>	

Common misconceptions

Some children may think;

- 'solid' is another word for hard or opaque
- Solids are hard and cannot break or change shape easily and are often in one piece
- Substances made of very small particles like sugar or sand cannot be solids⁶
- Particles in liquids are further apart than in solids and they take up more space
- When air is pumped into balloons, they become lighter
- Water in different forms – steam, water, ice – are all different substances
- All liquids boil at the same temperature as water (100°C)
- Melting, as a change of state, is the same as dissolving
- Steam is visible water vapour (only the condensing water droplets can be seen)
- Clouds are made of water vapour or steam
- The substance on windows etc. is condensation rather than water
- The change states of water (illustrated by the water cycle) are irreversible
- Evaporating or boiling water makes it vanish
- Evaporating is when the Sun sucks up the water, or when water is absorbed into a surface/material

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Observe closely and classify a range of solids. Observe closely and classify a range of liquids • Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind • Observe a range of materials melting e.g. ice, chocolate, butter • Investigate how to melt ice more quickly • Observe the changes when making rocky road cakes or ice cream • Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate • Explore freezing different liquids e.g. tomato ketchup, oil, shampoo 	<ul style="list-style-type: none"> • Can give reasons to justify why something is a solid, liquid or gas • Can give examples of things that melt/freeze and how their melting points vary • From their observations, can give the melting points of some materials • Using their data, can explain what affects how quickly a solid melts • Can measure temperatures using a thermometer • Can explain why there is a condensation on the inside the hot water cup but on the outside of the icy water cup • From their data, can explain how to speed up or slow down evaporation

<ul style="list-style-type: none">• Use a thermometer to measure temperatures e.g. icy water (melting) tap water, hot water, boiling water (demonstration)• Observe water evaporating and condensing e.g. on cups of icy water and hot water• Set up investigations to explore changing the rate of evaporation e.g. washing puddles, handprints on paper towels, liquids in containers.• Use secondary sources to find out about the water cycle	<ul style="list-style-type: none">• Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet.
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Year 4 - Sound

National Curriculum Objectives	
<ul style="list-style-type: none"> • Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. • Find patterns between the pitch of a sound and features of the object that produced it. • Find patterns between the volume of a sound and the strength of the vibrations that produced it. • Recognise that sounds get fainter as the distance from the sound source increases. 	
Prior Learning	Future Learning
<p>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense (Y1 – animals including humans)</p>	<ul style="list-style-type: none"> • Eaves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition (KS3) • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound (KS3) • Sound needs a medium to travel, the speed of sound in air, in water, in solids (KS3) • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum, sound waves are longitudinal (KS3) • Auditory range of humans and animals (KS3) • Pressure waves transferring energy, use for cleaning and physiotherapy by ultra-sound (KS3) • Waves transferring information for conversion to electrical signals by microphone (KS3)

What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>A sound produces vibrations, which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate allowing us to hear (sense) the sound.</p> <p>The loudness (volume) of the sound depends on the strength (size) of vibrations, which decreases as they travel through the medium. Therefore, sounds decreases in volume as you move away from the source. A sound insulator is a material, which blocks sound effectively.</p> <p>Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.</p>	<ul style="list-style-type: none"> • Can name sound sources and state that sounds are produced by the vibration of the object • Can state that sounds travel through different mediums such as air, water, metal • Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it. • Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing hard • Can give examples to demonstrate that sounds gat fainter as the distance from the sound source increases
Key vocabulary	
Sound, source, vibrate, vibration, travel, pitch (high, low) volume, faint, loud, insulation	
Common misconceptions	
<p>Some children may think;</p> <ul style="list-style-type: none"> • Sound is only heard by the listener • Sound only travels in one direction from the source • Sound can't travel through solids and liquids • High sounds are loud and low sounds are quiet 	

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none">• Classify sound sources• Explore making sounds with a range of objects, such as musical instruments and other household objects• Explore how string telephones or ear gongs work• Explore altering the pitch or volume of objects, such as the length of a guitar string, amount of water in bottles, size of tuning forks• Measure sounds over different distances• Measure sounds through different insulation materials	<ul style="list-style-type: none">• Can explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear• Can demonstrate how to increase or decrease pitch and volume using musical instruments or other objects• Can use data to identify patterns in pitch and volume• Can explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium.

Year 4 - Electricity

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify common appliances that run on electricity Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Explore the natural world around them, making observations and drawing pictures of animals and plants (The Natural World EYFS) Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (The Natural World EYFS) Understand some important processes and changes in the natural world around them, including the seasons and change states of matter. (The Natural World EYFS) 	<ul style="list-style-type: none"> Associate the brightness of a lamp or the volume of a buzzer with the number of voltage of cells used in the circuit (Y6 – Electricity) Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches (Y6 – Electricity) Use recognised symbols when representing a simple circuit in a diagram (Y6 – Electricity)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off.</p>	<ul style="list-style-type: none"> Can name the components in a circuit Can make electric circuits Can control a circuit using a switch Can name some metals that are conductors Can name materials that are insulators

<p>Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.</p>	
<p>Key vocabulary</p>	
<p>Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol.</p> <p>N.B. Children in year 4 do not need to use standard symbols for electrical components as this is taught in year 6.</p>	
<p>Common misconceptions</p>	
<p>Some children may think;</p> <ul style="list-style-type: none"> • Electricity flows to bulb, not through them • Electricity flows out of both ends of a battery • Electricity works by simply coming out of one end of a battery into the component. 	
<p>Apply knowledge in familiar related contexts, including a range of enquiries</p>	
<p>Activities</p>	<p>Possible evidence</p>
<ul style="list-style-type: none"> • Construct a range of circuits • Explore which materials can be used instead of wires to make a circuit • Classify the materials that were suitable/not suitable for wires • Explore how to connect a range of different switches and investigate how they function in different ways • Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm • Apply their knowledge of conductors and insulators to design and make different types of switch • Make circuits that can be controlled as part of a DT project • NB children should be given one component at a time to add. 	<ul style="list-style-type: none"> • Can communicate structures of circuits using drawings which show how the components are connected • Use classification evidence to identify that metals are good conductors and non-metals are insulators. • Can incorporate a switch into a circuit to turn it on and off • Can connect a range of different switches identifying the parts that are insulators and conductors • Can add a circuit with a switch to a DT project and can demonstrate how it works • Can give reasons for choice of materials for making different parts of a switch • Can describe how their switch works

Year 5

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

Year 5 – Living things and their habitats

National Curriculum Objectives	
<ul style="list-style-type: none"> Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Notice that animals, including humans, have offspring which grow into adults (Y2 – animals including humans) Explore the part that flowers play in the life cycle of flowering plants including pollination, seed formation and seed dispersal (Y3 – Plants) 	<ul style="list-style-type: none"> Reproduction in humans (as an example of a mammal) including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of material lifestyle on the foetus through the placenta (KS3) Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans have offspring, which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young, which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.</p>	<ul style="list-style-type: none"> Can draw the life cycle of a range of animals identifying similarities and differences between the life cycles Can explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways.

Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction, which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.		
Key vocabulary		
Life cycle, reproduce, sexual, sperm, fertilises, egg, live, young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings		
Common misconceptions		
<p>Some children may think;</p> <ul style="list-style-type: none"> • All plants start out as seeds • All plants have flowers • Plants that grow from bulbs do not have seeds • Only birds lay eggs 		
Apply knowledge in familiar related contexts, including a range of enquiries		
Activities	Possible evidence	
<ul style="list-style-type: none"> • Use secondary sources and where possible, first hand observations to find out about the life cycle of a range of animals • Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth • Look for patterns between the size of an animal and its expected life span • Grow and observe plants that reproduce asexually e.g. strawberries, spider plants and potatoes • Take cuttings form a range of plants e.g. African violet, mint • Plant bulbs and then harvest to see how they multiply • Use secondary sources to find out about pollination 	<ul style="list-style-type: none"> • Can present their understanding of the life cycle of a range of animals in different ways e.g. drama, pictorially, chronological reports, creating a game • Can identify patterns in life cycles • Can compare two or more animals life cycles they have studied • Can explain how a range of plants reproduces asexually. 	

Year 5 – Animals including humans

National Curriculum Objectives	
<ul style="list-style-type: none"> Describe the changes as humans develop to old age. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Notice that animals, including humans, have offspring which grow into adults (Y2 – Animals including humans) 	<ul style="list-style-type: none"> Reproduction in humans (as an example of a mammal) including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of material lifestyle on the foetus through the placenta (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.</p> <p>This needs to be taught alongside PSHE. The statutory requirements for relationships and health education can be found below.</p> <ul style="list-style-type: none"> Statutory guidance on Physical health and mental wellbeing (primary and secondary) <p>Other useful guidance includes;</p> <ul style="list-style-type: none"> Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for science 	<ul style="list-style-type: none"> Can explain the changes that takes place in boys and girls during puberty Can explain how a baby changes physically as it grows and also what it is able to do

Key vocabulary	
Puberty – the vocabulary to describe sexual characteristics	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • A baby grows in a mother’s tummy • A baby is ‘made’ 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
This unit is likely to be taught through direct instruction due to its sensitive nature, although children can carry out a research enquiry by asking an expert e.g. school nurse to provide answers to questions that have been filtered by the teacher	<ul style="list-style-type: none"> • Can present information about the changes occurring during puberty as an information leaflet for other Y5 children or answers to ‘problem page questions’

Year 5 – Properties and changes of materials

National Curriculum Objectives	
<ul style="list-style-type: none"> • Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets. • Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (Y2 – Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2 – Uses of everyday materials) • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials (Y3 – Forces and magnets) • Compare and group materials together according to whether they are solids, liquids or gases (Y4 – States of matter) • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) (Y4 – States of matter) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature (Y4 – States of matter) 	<ul style="list-style-type: none"> • Chemical reactions as the rearrangement of atoms (KS3) • Representing chemical reactions using formulae and using equations. (KS3) • Combustion, thermal decomposition, oxidation and displacement reactions (KS3) • Defining acids and alkalis in terms of neutralisation reactions. (KS3) • The pH scale for measuring acidity/alkalinity and indicators (KS3)

What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid, form a solution while others are insoluble, and form sediment.</p> <p>Mixtures can be separated by filtering, sieving and evaporation.</p> <p>Some changes to materials such as dissolving, mixing and changes of state are reversible but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.</p>	<ul style="list-style-type: none"> • Can use understanding of properties to explain everyday uses of materials, for example, how bricks, wood, glass and metals are used in buildings • Can explain what dissolving means, giving examples • Can name equipment used for filtering and sieving • Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving • Can describe some simple reversible and non-reversible changes to materials, giving examples.
Key vocabulary	
<p>Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material.</p>	
Common misconceptions	
<p>Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.</p> <p>Some children may think;</p> <ul style="list-style-type: none"> • Thermal insulators keep cold in or out • Thermal insulators warm things up • Solids dissolved in liquids have vanished and so you cannot get them back • Lit candles old melt, which is a reversible change 	

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat • Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate • Investigate rates of dissolving by carrying out comparative and fair test. • Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture • Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, example of burning rate or rusting? What affects the amount of gas produced? • Research new materials produced by chemicals e.g. Spencer Silver (glue or sticky notes) and Ruth Benerito (wrinkle free cotton) 	<ul style="list-style-type: none"> • Can create a chart or table grouping/comparing everyday materials by different properties • Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose • Can group solids based on their observations when mixing them with water • Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water • Can explain the results from their investigations

Year 5 – Earth and Space

National Curriculum Objectives	
<ul style="list-style-type: none"> Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Describe the movement of the Moon relative to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Observe changes across the four seasons (Y1 – Seasonal changes) Observe and describe weather associated with the seasons and how day length varies (Y1 – Seasonal) 	<ul style="list-style-type: none"> Gravity force, weight = mass x gravitational field strength (g) on Earth $g = 10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). Our sun as a star, in our galaxy, other galaxies. The seasons and the Earth's tilt day length at different times of year, in different hemispheres. The light year as a unit of astronomical distance.
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>The sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes $365\frac{1}{4}$ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, then Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.</p>	<ul style="list-style-type: none"> Can create a voice over for a video clip or animation Can show using diagrams, the movement of the Earth and Moon Can explain the movement of the Earth and Moon Can show using diagrams the rotation of the Earth and how this causes day and night Can explain what causes day and night

Key vocabulary	
Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	
Common misconceptions	
Some children may think;	
<ul style="list-style-type: none"> • The Earth is flat • The Sun is a planet • The Sun rotates around the Earth • The Sun moves across the sky during the day • The Sun rises in the morning and sets in the evening • The Moon appears only at night • Night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth. 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth • Use secondary sources to help make a model to show why day and night occur • Make first-hand observations of how shadows caused by the Sun change through the day. • Make a sundial • Research time zones • Consider the views of scientists in the past and evidence used to deduce shapes and movement of the Earth, Moon and planets before space travel. 	<ul style="list-style-type: none"> • Can use the model to explain how the Earth moves in relation to the Sun and the Moon moves in relation to the Earth • Can demonstrate and explain verbally how day and night occur • Can explain evidence gathered about the position of shadows in term of the movement of the Earth and show this using a model • Can explain how a sundial works • Can explain verbally using a model, why we have time zones • Can describe the arguments and evidence used by scientists in the past

Year 5 - Forces

National Curriculum Objectives	
<ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction that act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Compare how things move on different surfaces. (Y3 – Forces and magnets) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 – Forces and magnets) • Observe how magnets attract or repel each other and attract some materials and not others. (Y3 – Forces and magnets) • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, identify some magnetic materials. (Y3 – Forces and magnets) • Describe magnets as having two poles (Y3 – Forces and magnets). • Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 – Forces and magnets) 	<ul style="list-style-type: none"> • Magnetic fields by plotting with compass, representation by field lines. (KS3) • Earth's magnetism, compass and navigation. (KS3) • Forces as pushes or pulls, arising from the interaction between two objects. (KS3) • Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3) • Moment as the tuning effect of a force. (KS3) • Forces; associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3) • Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.</p>	<ul style="list-style-type: none"> • Can demonstrate the effect of gravity acting on an unsupported object • Can give examples of friction, water resistance and air resistance

<p>Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.</p> <p>A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p>	<ul style="list-style-type: none"> • Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance • Can demonstrate how pulleys, levers and gears work
<p>Key vocabulary</p>	
<p>Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>	
<p>Common misconceptions</p>	
<p>Some children may think;</p> <ul style="list-style-type: none"> • The heavier the object the faster it falls, because it has more gravity acting on it • Forces always act in pairs which are equal and opposite • Smooth surfaces have no friction • Objects always travel better on smooth surfaces • A moving object has a force which is pushing it forwards and it stops when the pushing force wears out • A non-moving object has no forces acting on it • Heavy objects sink and light objects float 	
<p>Apply knowledge in familiar related contexts, including a range of enquiries</p>	
<p>Activities</p>	<p>Possible evidence</p>
<ul style="list-style-type: none"> • Investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter • Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of the water 	<ul style="list-style-type: none"> • Can explain the results of their investigations in terms of the force, showing a good understanding that as the objects tries to move through the water or air or across the surface the particles in the water, air or on the surface slow it down

<ul style="list-style-type: none">• Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats• Explore how levers, pulleys and gears work• Make a product that involves a lever, pulley or gear• Create a timer that uses gravity to move a ball• Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation	<ul style="list-style-type: none">• Can demonstrate clearly the effects of using levers, pulleys and gears.
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Year 6

Divided by topic and Year group the subject breakdown identifies what should be taught in each topic in science identifying key questions, vocabulary and learning.

Year 6 – Living things and their habitats

National Curriculum Objectives	
<ul style="list-style-type: none"> Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Recognise that living things can be grouped in a variety of ways (Y4 – Living things and their habitats) Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment (Y4 – Living things and their habitats) Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Y5 – Living things and their habitats) Describe the life process of reproduction in some plants and animals (Y5 – Living things and their habitats) 	<ul style="list-style-type: none"> Differences between species (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Living things can be formally groups according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. microorganisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.</p> <p>Animals can be divided into two main groups; those that have backbones (vertebrates) and those that do not (invertebrates). Vertebrates can be divided into five small groups; fish, amphibians,</p>	<ul style="list-style-type: none"> Can give examples of animals in the five vertebrate groups and some of the invertebrate groups Can give the key characteristics of the five vertebrate groups and some invertebrate groups Can compare the characteristics of animals in different groups Can give examples of flowering and non-flowering plants

<p>reptiles, birds and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.</p> <p>Plants can be divided broadly into two main groups; flowering plants and non-flowering plants.</p>	
<p style="text-align: center;">Key vocabulary</p>	
<p>Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering.</p>	
Common misconceptions	
<p>Some children may think;</p> <ul style="list-style-type: none"> • All micro-organisms are harmful • Mushrooms are plants 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important • Use first-hand observation to identify characteristics shared by the animals in a group. • Use secondary sources to research the characteristics of animals that belong to a group • Use information about the characteristics of an unknown animal or plant to assign it to a group • Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys • Create an imaginary animal, which has features from one or more groups. 	<ul style="list-style-type: none"> • Can use classification materials to identify unknown plants and animals • Can create classification keys for plants and animals • Can give a number of characteristics that explain why an animal belongs to a particular group

Year 6 – Animals including humans

National Curriculum Objectives	
<ul style="list-style-type: none"> Identify and name the main parts of the human-circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals including humans. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene (Y2 – animals including humans) Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get nutrition from what they eat (Y3 – Animals including humans) Describe the simple functions of the basic parts of the digestive system in humans (Y4 – animals including humans) Identify the different types of teeth in humans and their simple functions (Y4 – Animals including humans) 	<ul style="list-style-type: none"> The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases (KS3) The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3) The structure and functions of the gas exchange system in humans, including adaptations to function (KS3) The mechanism of breathing to move air in and out of the lungs (KS3) The impact of exercise, asthma and smoking on the human gas exchange system (KS3)
What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.</p>	<ul style="list-style-type: none"> Can draw a diagram of the circulatory system, label the parts, and annotate it to show what the parts do. Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart

Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE. The statutory requirements for relationships and health education can be found below

[Statutory guidance on Physical health and mental wellbeing \(primary and secondary\)](#)

Key vocabulary

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

Common misconceptions

Some children may think;

- Your heart is on the left side of your chest
- The heart make blood
- The blood travels in one loop from the heart to the lungs and around the body
- When we exercise, our heart beats faster to work the muscles more
- Some blood in our bodies is blue and some blood is red
- We just eat food for energy
- All fat is bad for you
- All diary is good for you
- Protein is good for you, so you can eat as much as you want
- Foods only contain fat, if you can see it
- All drugs are bad for you

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Create a role play model for the circulatory system • Carry out a range of pulse rate investigations; <ul style="list-style-type: none"> ○ Fair test – effect of different activities on my pulse rate ○ Pattern seeking – exploring which groups of people may have higher or lower resting pulse rates ○ Observation over time – how long does it take my pulse rate to return to my resting pulse rate (recovery rate) ○ Pattern seeking – exploring recovery rate for different groups of people • Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources 	<ul style="list-style-type: none"> • Use the role play model to explain the main parts of the circulatory system and their role • Can use subject knowledge about the heart whilst writing conclusions for investigations • Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body • Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body

Year 6 – Evolution and inheritance

National Curriculum Objectives	
<ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Identify how animals and plants are adapted to suit their environment in different ways and that adaption may lead to evolution. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 – Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults (Y2 – Animals including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal (Y3 – Plants) • Describe in simple terms how fossils are formed when things that have lived are trapped within rock (Y3 – Rocks) • Recognise that environments can change and that this can sometimes pose dangers to living things (Y4 – Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Living things and their habitats – Y5) 	<ul style="list-style-type: none"> • Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3) • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model (KS3) • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection (KS3) • Changes in the environment may leave individuals within a species and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction (KS3)

What pupils need to know or do to be secure

Show understanding of a concept using scientific vocabulary correctly

Key learning	Possible evidence
<p>All living things have offspring of the same kind, as features in their offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and may vary from each other.</p> <p>Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.</p> <p>Fossils give us evidence of what lived on Earth millions of years ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties within their own characteristics.</p>	<ul style="list-style-type: none"> • Can explain the process of evolution • Can give examples of how plants and animals are suited to an environment • Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth • Give examples of living things that lived millions of years ago and the fossil evidence we have to support this • Can give examples of fossil evidence that can be used to support the theory of evolution
Key vocabulary	
<p>Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p>	

Common misconceptions

Some children may think;

- Adaption occurs during an animals lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their lifetime
- Offspring most resemble their parents of the same sex, so that sons look like fathers
- All characteristics including those that are due to actions during the parent's life such as dyed hair or footballing skills can be inherited
- Cavemen and dinosaurs were alive at the same time

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none"> • Design a new plant or animal to live in a particular habitat • Use models to demonstrate evolution e.g. 'Darwin's finches' bird beak activity • Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution • Make observations of fossils to identify living things that lived on Earth millions of years ago. • Identify features in animals and plants that are passed on to offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs. • Compare the ideas of Charles Darwin and Alfred Wallace on evolution • Research the work of Mary Anning and how this provided evidence of evolution. 	<ul style="list-style-type: none"> • Can identify characteristics that will make a plant or animal suited or not suited to a particular habitat • Can link the patterns seen in the model to real examples • Can explain why the dominant colour of the peppered moth changed over a very short period of time

Year 6 - Light

National Curriculum Objectives	
<ul style="list-style-type: none"> • Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from a light source to objects and then to our eyes • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light (Y3 – Light) • Notice that light is reflected from surfaces (Y3 – Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes (Y3 – Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object (Y3 – Light) • Find patterns in the way that the size of shadows change (Y3 – Light) • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets (Y5 – Properties and changes of materials) 	<ul style="list-style-type: none"> • The similarities and differences between light waves and waves in matter. (KS3) • Light waves travelling through a vacuum; speed of light (KS3) • The transmission of light through materials; absorption, diffuse scattering and specular reflection at a surface (KS3) • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye (KS3) • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras.(KS3) • Colours and different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection (KS3)

What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects, some light must be reflected from the object into our eyes for the object to be seen.</p> <p>Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines, the shape of the shadow will be the same as the outline shape of the object.</p>	<ul style="list-style-type: none"> • Can describe, with diagrams or models as appropriate, how light travels in straight lines either from sources or reflected from other objects into our eyes • Can describe, with diagrams or models as appropriate, how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape
Key vocabulary	
<p>Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous, straight lines, light rays</p>	
Common misconceptions	
<p>Some children may think;</p> <ul style="list-style-type: none"> • We see objects because light travels from our eyes to the object 	
Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	Possible evidence
<ul style="list-style-type: none"> • Explore different ways to demonstrate that light travels in straight lines, e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shapes holes in card • Explore the uses of the behaviour of light, reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets. 	<ul style="list-style-type: none"> • Can explain how evidence from enquiries shows that light travels in straight lines • Can predict and explain, with diagrams or models as appropriate, how the path of light rays can be directed by reflection to be seen, e.g. the reflection in car rear view mirrors or in a periscope • Can predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied.

Year 6 - Electricity

National Curriculum Objectives	
<ul style="list-style-type: none"> • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram. 	
Prior Learning	Future Learning
<ul style="list-style-type: none"> • Identify common appliances that run on electricity (Y4 – Electricity) • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers (Y4 – Electricity) • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery (Y4 – Electricity) • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit (Y4 – Electricity) • Recognise some common conductors and insulators, and associate metals with being good conductors (Y4 – Electricity) 	<ul style="list-style-type: none"> • Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3) • Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential differences (p.d.) to current (KS3) • Differences in resistance between conducting and insulating components (quantitative) (KS3) • Static electricity (KS3)

What pupils need to know or do to be secure	
Show understanding of a concept using scientific vocabulary correctly	
Key learning	Possible evidence
<p>Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.</p> <p>You can use recognised circuit symbols to draw simple circuit diagrams.</p>	<ul style="list-style-type: none"> • Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs, can be changed by increasing or decreasing the number or cells or using cells of different voltages. • Can draw circuit diagrams of a range of simple series circuits using recognised symbols
Key vocabulary	
<p>Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage.</p> <p>N.B. Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words 'cells' and 'batteries' are now used interchangeably.</p>	
Common misconceptions	
<p>Some children may think;</p> <ul style="list-style-type: none"> • Larger-sized batteries make bulbs brighter • A complete circuit uses up electricity • Components in a circuit that are closer to the battery get more electricity 	

Apply knowledge in familiar related contexts, including a range of enquiries

Activities	Possible evidence
<ul style="list-style-type: none">• Explain how a circuit operates to achieve particular operations, such as to control the light from a torch with different brightness or make a motor go faster or slower• Make circuits to solve particular problems, such as a quiet and a loud burglar alarm• Carry out fair tests exploring changes in circuits• Make circuits that can be controlled as part of a DT project	<ul style="list-style-type: none">• Can incorporate a switch into a circuit to turn it on or off• Can change cell and components in a circuit to achieve a specific end• Can communicate structures of circuits using circuit diagrams with recognised symbols• Can devise ways to measure brightness of bulbs, speed of motors, volume of a buzzer during a fair test• Can predict results and answer questions by drawing on evidence gathered

Useful Websites

Teaching science through stories - stem

<https://www.stem.org.uk/teaching-science-through-stories>

STEM

<https://www.stem.org.uk/>

Science association

<https://www.ase.org.uk/>

PLAN assessment

<https://www.planassessment.com/introduction-to-plan>

Teaching science in the foundation stage

<https://pstt.org.uk/resources/cpd-units/teaching-foundation-in-the-foundation-stage>

Primary science teaching trust

<https://pstt.org.uk/>

Oxford Owl

<https://www.oxfordowl.co.uk/for-home/at-school/subject-guides/science-at-primary-school/>

Manchester University – resources for children’s science

<https://www.childrensuniversity.manchester.ac.uk/learning-activities/science/>

Developing Experts – for resources and videos

<https://www.developingexperts.com/>

BBC videos

<https://www.bbc.co.uk/bitesize/topics/z6882hv/articles/zc6br82>